



ODA Plant Division



Section Five: Plant Health

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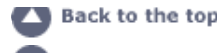
Introduction

The Plant Health Section provides official field inspections and laboratory testing for Oregon's seed, nursery, and Christmas tree industries. This testing is required for shipment to interstate and international markets. The section's pathologists also provide commodity groups and trade negotiation officials with official statements to facilitate the opening of new markets for Oregon's agricultural commodities.

The Plant Health Section has responsibility for several state quarantines, control area orders, and other regulations for plant pathogens. These administrative rules are designed to prevent exotic pathogens from being introduced or becoming established in the state and to provide quarantine pest-free production areas for Oregon growers.

In cooperation with USDA, the Plant Health Section conducts statewide surveys for exotic pathogens. These surveys are federally funded and help provide crucial data to keep interstate and international markets open to Oregon's agricultural products.

We are also active in helping to shape national policy on important pathogens such as Phytophthora ramorum and Potato Virus Yn (necrotic strain). Staff scientists are regularly consulted by PPQ, and provide crucial input to national plant disease control efforts. Staff expertise is maintained and enhanced with an active research program that develops and publishes new diagnostic protocols for regulated and emerging plant pathogens.



Highlights

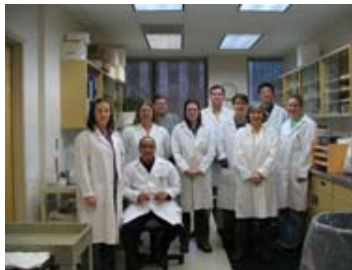
- In 2005, *P. ramorum* was detected in 21 nursery and related sites. Quick responses by the Plant Health and Nursery & Christmas Tree sections allowed for the eradication of *P. ramorum* from most of these sites. A few were identified late enough in the year that they will remain under federal regulation into early 2006. Eradication efforts in Curry County continue.
- Blackberry rust, an exotic fungal disease, was discovered infecting wild Himalaya and commercially grown evergreen blackberries in Western Oregon. Plant Health and Noxious Weed Control staff worked together to identify the rust and the extent of the infestation.
- The number of seed lots tested for export phytosanitary certification rose 4 percent in 2005. The number of requests for seed field inspections rose 7 percent. Participants in the blueberry virus testing program grew 44 percent from last year.
- Plant Health continued to revise rules in 2005. Most notably, the control area order for Allium white rot in central Oregon, our main production area, was repealed in favor of a statewide White Rot of Vegetative Allium Seed Certification program.
- The section went through staff changes. Cindy Fraley was promoted to Certification Specialist within the section. Robin Ludy took over Cindy's Natural Resource Specialist (NRS 2) position working with Dr. Xiangqi (Shawn) Meng. Beverly Clark, NRS 2 working with Dr. Mohamed (Sid) Sedegui, was promoted to Nursery Inspector. Melissa Austin was hired to replace Bev. Rebecca Tippner-Hedges (NRS 1) also joined our staff to work with Dr. Sedegui. For the first time in more than two years, the Plant Health Section was at full staff.

With this dramatically increased workload, the staff managed to sustain the high level of competence expected of our section, maintaining a remarkably low laboratory test error rate of 0.08 percent. It is a privilege to serve with such an exceptional and dedicated group. Thank you for all your hard work.

Nancy K. Osterbauer, Ph.D.  
Senior Plant Pathologist

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Current Plant Health Section staff. Seated: Sid Sedegui. First row: Melissa Austin, Cindy Fraley, Rebecca Tippner-Hedges, Nancy Osterbauer, Robin Ludy, Erika Berghauer. Second row: Steve Finch, Aaron Trippe, Shawn Meng.



## Eradication programs

### *Phytophthora ramorum*

*Phytophthora ramorum*, the cause of sudden oak death (SOD) and related diseases, was first discovered in Curry County, Oregon in 2001. Since then, the ODA, Oregon Department of Forestry (ODF), USDA Forest Service, Oregon State University, and the affected landowners have been trying to eradicate the pathogen from the infected forest areas. Since 2001, a total of 88 acres (including 2005 data) have been treated for the disease. Treatment consists of cutting, piling, and burning host plants within each infection center and asymptomatic hosts within 50- to 100-feet of each infection center. Tan oak stumps are also treated to prevent re-sprouting. The sites have been monitored periodically since being treated. Surveys in and around the sites showed that the treatments effectively limited the spread of the pathogen on most sites and apparently eliminated it on others including a site (1.4 acres) that has remained free of *P. ramorum* for two years post-treatment. Of the 951 samples collected within the sites in 2005, two soil samples from one site were positive for the pathogen, post-treatment. The eradication and monitoring efforts will continue in 2006.

In 2005, aerial, ground, and stream surveys for *P. ramorum* were conducted in southwestern Oregon. The ODF led this effort with cooperation from the other agencies. The aerial survey covered 1.16 million acres. All dead tan oaks identified from the air were then checked on the ground. Ground checking of those suspicious trees identified another 18 acres (including expansion of nine previously identified sites) that required treatment for *P. ramorum*. Stream surveys were conducted on waterways within and outside of the quarantine area. Four stream positives were found; one within the quarantine area and three outside. Two infected tan oaks were found associated with one of the streams outside the quarantine area. The remaining two streams and surrounding flora continue to be intensively monitored. These findings will lead to an expansion of the quarantine area in 2006. All positive sites were treated as described above. The sites will be monitored for the pathogen for the next two years. If *P. ramorum* is not detected during that time, the pathogen will be declared eradicated.

On December 21, 2004, the USDA adopted a federal order requiring that all West Coast nurseries shipping plants interstate be surveyed for *P. ramorum*. Nurseries growing plants susceptible to *P. ramorum* (host nurseries) had to be visually surveyed for suspicious symptoms and a minimum number of samples collected for testing in the laboratory using USDA-approved methods. Nurseries growing non-host plants had to be visually surveyed as well. However, samples were collected only if suspicious symptoms were found. Nurseries found to be *P. ramorum*-free then had to enter into a Federal compliance agreement in order to ship interstate (see related article in the Nursery & Christmas tree Section).

ODA staff collected 51,645 samples from 1,021 host and 13 non-host nursery growing areas to test for the presence of *P. ramorum* using the USDA-approved ELISA and nested PCR tests. The USDA requires that all nested PCR-positive samples be sent to their laboratory for official confirmation. Phytophthora species were detected at 156 (15 percent) and *P. ramorum* at eight (<1 percent) of the sites surveyed. The USDA Confirmed Nursery Protocol was enacted at the eight sites. All eight have completed the protocol. Seven hundred ninety-six host nurseries and 1,028 non-host nurseries have entered into federal compliance agreements and are eligible to ship plants interstate.

In May 2005, the ODA surveyed Christmas tree plantations planted in *Abies* spp. and *Pseudotsuga menziesii* for *P. ramorum*. Plantations in 22 counties were surveyed. The number of plantations surveyed in each county varied depending upon the total acreage of Christmas trees grown within the county. A total of 103 plantations were visually inspected according to the standards of the 2005 USDA National Survey Protocol for *P. ramorum*, with 4,170 samples collected for testing as described above. *P. ramorum* was not detected in any of the samples, nor was any other Phytophthora. This is the fourth consecutive year that no *P. ramorum* has been found in Oregon Christmas tree plantations.

Throughout the state, the ODA surveyed retail nurseries that sell plants susceptible to *P. ramorum*. One hundred thirty-six retail nurseries were visually inspected according to the standards of the 2005 USDA National Survey Protocol, with 5,590 samples collected for testing as described above. Phytophthora species were detected at 24 (18 percent) and *P. ramorum* at four (3 percent) of the sites surveyed. The USDA Confirmed Nursery Protocol was enacted at the four sites. One nursery has yet to complete the requirements of the USDA protocol.

[Chart: Number of agricultural commodities samples collected and tested for \*P. ramorum\* since 2001.](#)

In addition to the agricultural commodities surveys described above, the ODA has completed trace-out investigations to both nursery and landscape sites. Three hundred twenty-six sites have been surveyed with 9,060 samples collected for testing as described above. Phytophthora species have been detected at 25 sites (8 percent) and *P. ramorum* at nine sites (3 percent). Of the nine positive sites, three were nursery and six were landscape. The USDA Confirmed Nursery and Confirmed Residential and Landscape protocols were enacted at the nine sites as appropriate. Two landscape sites and two nurseries have yet to complete the requirements of the USDA eradication protocols.

Based on the nursery surveys and trace out investigations described above, a total of 21 nursery and landscape sites were infected with *P. ramorum* in 2005 and the appropriate USDA eradication protocol enacted at each site. ODA staff collected and tested a total of 18,790 samples to meet the requirements of the USDA eradication protocol.

ODA staff also surveyed 10 shipments of nursery stock for *P. ramorum*, collecting 170 samples for laboratory testing.

No *P. ramorum* was detected. The ODA, in cooperation with ODF, also conducted enhanced perimeter (forest) surveys around the 21 infected nursery and landscape sites according to the USDA Forest Service National Survey Protocol. Of the 53 samples collected for testing, none were infected with *P. ramorum*.

Survey results were posted in the National Agricultural Pest Information System (NAPIS).



## Certification and survey programs

### Blackberry rust

In 2005, blackberry rust caused by the exotic fungus *Phragmidium violaceum* was identified for the first time infecting wild Himalaya and commercially grown evergreen blackberries in western Oregon. This rust forms several spore types on susceptible blackberries. The spores infect the flower buds, leaves and stems of the primocanes and floricanes. Foliar symptoms include circular purplish leaf spots with yellow to tan centers on the upper leaf surface accompanied by yellowish-orange pustules on the lower leaf surface. Pustules may also form on the flower buds and canes. Continuous defoliation as well as stem infections by the pathogen may cause cane dieback. Black pustules develop in the late summer/early fall on infected leaves. The rust has been officially identified in 16 counties in western Oregon indicating the disease is established in the state. (See related article in the Noxious Weed Section).

[Photo: Blackberry rust infecting the blossoms, leaves, and canes of Himalaya blackberry.](#)

### Columbia root-knot nematode

Nursery Program staff collected 90 nematode samples from Oregon production nurseries in 2005. Plant-parasitic nematodes were detected in 70 percent of the samples with *Pratylenchus* spp. being the most abundant (present in 57 percent of the samples). Meloidogyne species were detected in four samples. No Columbia root-knot nematodes (*M. chitwoodii*, CRKN) were detected in Oregon nurseries based on morphometric analysis of juveniles. This annual survey is conducted at the request of Canadian agricultural officials to demonstrate that Oregon production nurseries are free of CRKN.

### Region-wide nematode survey

Staff members collected 132 nematode field samples from Oregon alfalfa, bean, beet, cabbage, carrot, chicory, corn, garlic, mint, onion, pea, potato, radish, sorghum, spinach, and Swiss chard fields. Plant parasitic nematodes were detected in 76 percent of the samples with *Pratylenchus* spp. and *Paratylenchus* spp. being the most abundant (present in 70 percent and 22 percent of the samples, respectively). Other plant parasitic nematodes detected included *Tylenchorynchus*, *Meloidogyne*, *Helicotylenchus*, *Ditylenchus*, *Heterodera*, *Mesocriconema*, *Trichodorus*, and *Rotylenchus*. *Meloidogyne chitwoodii* was detected in potato fields in three counties: Klamath (two fields), Baker (one field), and Morrow (two fields). Results were posted in NAPIS.

### Allium white rot

In 2005, the ODA adopted rules for White Rot Certification of Vegetative Allium Seed to replace the control area order (CAO) for central Oregon. The CAO, which included quarantine language, was repealed because the disease is established in central Oregon and the certification program adopted because a vegetative Allium seed industry still exists in that part of the state. Department staff inspected 47 fields (1,563 acres) of garlic and onion for the presence of white rot, *Sclerotium cepivorum*, in central and eastern Oregon. The inspection is a 100 percent inspection, designed to find single strikes of white rot. All fields inspected were found to be free of the pathogen and received certification documents.

### Mint Verticillium wilt

The Plant Division offers a mint rootstock field inspection service to detect *Verticillium* species in established control areas. Under the provisions of the control area order, any fields confirmed as *V. dahliae*-positive cannot be used as a rootstock source. Mint growers in Union County submitted requests to inspect 10 fields. Growers in Klamath County submitted requests to inspect three fields. The total acreage inspected was 382. *Verticillium* species was detected in two fields in 2005.

### Potato late blight

Staff from ODA's Commodity Inspection and Plant divisions conducted field surveys for potato late blight fungus, *Phytophthora infestans*, in northeast, south-central, western, and northwest Oregon. A total of 71 fields and 5,924 acres were inspected in 2005. The most common varieties inspected included Russet Norkotah and Yukon Gold. No potato late blight was found.



## Seed field inspections

Staff from Plant Health inspected 463 seed fields (9,030 acres) for the presence of seed-borne or seed associated pathogens of concern in 2005. This represents a 7 percent increase in the number of seed fields surveyed from the previous year. Inspectors surveyed for the presence of 100 different pathogens of concern on 26 different host crops. Surveys found 149 seed fields with at least one disease of concern. The majority of fields (68 percent) were free from disease. The most common pathogens observed were *Xanthomonas campestris* pv. *carotae* causing bacterial blight of carrot, *Erwinia carotovora* subsp. *carotovora* causing soft rot of carrot, *Botrytis porri* causing neck rot of onion and garlic, *Sclerotinia sclerotiorum* causing stem rot of cabbage, and *Ustilago maydis* causing common smut of corn.

[Chart: Overview of seed fields grown for export inspected for diseases of regulatory concern \(1992-2005\)](#)

### Onion smut survey

In July 2005, 14 onion fields in Morrow and Umatilla counties (698 acres representing 14 percent of the planted acreage) were surveyed for onion smut caused by *Urocystis cepulae*. No onion smut was identified in these fields. This survey was requested for fresh onion export to Australia and will be continued in 2006.

### Chrysanthemum white rust

In 2005, a survey was conducted for chrysanthemum white rust (CWR), caused by *Puccinia horiana*. Three thousand one hundred fifty-four plants grown by 21 hobbyists were visually inspected in the spring and/or fall for the disease and suspicious plants brought back to the laboratory for official confirmation. No CWR was found. This is the first

official detection survey for CWR in Oregon since 2001.

#### **Karnal bunt**

Karnal bunt, *Tilletia indica*, is a fungal disease of wheat. After its discovery in Arizona, many countries implemented quarantines to prevent the introduction of this disease. In response to those quarantines, Oregon began participating in a national survey program that certifies wheat as free from Karnal bunt. Oregon has participated in this program since 1996 and has never found Karnal bunt. In 2005, 36 samples were obtained from 12 counties that produced commercial quantities of wheat and were sent to the federal testing laboratory in Texas for processing. Karnal bunt spores were not found in any of the wheat samples examined.

#### **Virus certification of nursery stock**

Twenty-three nurseries participated in the fruit and ornamental tree virus certification program in 2005. *Malus* spp., *Prunus* spp., *Pyrus* spp. and *Cydonia* spp. are included in the testing program. This year, 3,452 individual *Prunus* mother (scion) trees and 8,363 *Malus* spp., *Pyrus* spp., and *Cydonia* spp. individual trees were tested for Tomato ring spot virus, Prune dwarf virus (PDV), and *Prunus* necrotic ring spot virus (PNRSV) using ELISA. PDV was detected in 90 trees and PNRSV in 44 trees. A summary of the virus-free varieties grown by each nursery is sent yearly to state, federal, and Canadian officials to facilitate the movement of the nursery's products. We are beginning the second year of a survey for apple chlorotic leaf spot virus (ACLSV). This virus was added because of a new quarantine requirement imposed by the Washington State Department of Agriculture (WSDA) and to comply with Canadian and Mexican regulations for the import of plant material from the USA. This survey is conducted in the fall due to higher levels of the virus in dormant buds. As of the end of the year, we had collected and tested 1,329 field samples of *Malus* and *Pyrus* rootstock and stool bed materials using diagnostic techniques and sampling procedures required by WSDA. One hundred six samples were positive for ACLSV.

#### **Blueberry virus testing**

Nine nurseries participated in the testing program for blueberry scorch Carlavirus (BIScV) and blueberry shock Ilarvirus (BIShV) in 2005. The testing is done at the request of nurseries to comply with the regulatory requirements of other states and countries. A total of 18,601 samples were collected by nursery inspectors and submitted to the laboratory for testing. BIShV was detected in 135 field samples from one nursery using ELISA.

#### **Potato virus Y**

The USDA Animal & Plant Health Inspection Service (APHIS) and the Canadian Food Inspection Agency entered into an agreement to survey all potato-growing states for Potato Virus Y (PVY) and its variant PVYN (necrotic strain). We are entering the second year of the survey. The USDA is requiring random testing of field-grown potatoes from lots fourth generation or higher. The department, with the help of the Oregon State University Seed Certification Program, identified and tested 3,503 tubers collected in 2004. Another 901 tubers from Washington were also tested. PVY was detected in 13 percent of all tubers tested (based on two tubers/test) and PVYN in 0.2 percent (one tuber/test). PVY- and PVYN-infected tubers were found in both Oregon and Washington. The ODA anticipates testing about 1,500 tubers from both states in 2005-2006.

#### **Laboratory grass seed testing**

In 2005, Plant Health staff conducted more than 7,000 laboratory tests to detect specific seed-borne fungi, bacteria, nematodes, viruses, pests, diseases, and other miscellaneous problems. A total of 3,804 seed lots of more than 15 different crops were tested. There were 3,804 tests conducted for pest and disease plus soil and an approximately equivalent number of other miscellaneous detection tests conducted. Two hundred ninety-four seed lots out of 3,804 tested were positive according to approved testing protocols for one or more pathogens of regulatory concern or for other problems. These tests were requested by Oregon seed producers to meet the phytosanitary requirements of their foreign customers.

[Chart: Percent of different tests performed](#)

#### **Endophyte testing**

In 2005, the Plant Health Laboratory received 175 seed lots of forage grass seed varieties to be tested for the presence of the endophyte fungus, *Epichloa* sp. The endophyte fungus produces alkaloids that can be toxic to livestock. This year, the section switched to a new, more reliable testing technique based on immunoblotting. To qualify for an endophyte tag, no more than 5 percent of the seeds in a lot can be infected. Fourteen seed lots out of 175 tested positive, with more than 5 percent of seeds infected.

#### **Dutch elm disease**

Dutch elm disease, a deadly tree disease caused by the fungi *Ophiostoma novo-ulmi*, and *O. ulmi*, has been found in Oregon's Willamette Valley. It was first detected in 1978 in Portland. Its normally rapid spread has been slowed by a diligent survey and eradication program supported by a state quarantine. In 2005, 45 out of 52 samples submitted to the laboratory were infected. Two infected trees were removed in Corvallis as were 43 infected trees in Portland in an effort to slow the spread to other, currently healthy elm trees in the immediate area.

#### **General diagnostic tests**

The Plant Health Laboratory provides a general diagnostic service for the nursery industry, various governmental agencies, licensed landscapers, and other customers. Many tests are conducted in addition to those required by specific survey and certification programs. The laboratory activities related to certification programs are summarized elsewhere. This year the Plant Health Laboratory performed 273 general diagnostic and nursery tests. Tests performed included screening for nematodes (mist chamber and sucrose filtration), fungi and bacteria (microscope and media), and visual analysis for pests and abiotic problems. Plant pathogens were found associated with 56 percent of the samples tested. Nematodes (32 percent) and fungi (12 percent) were recovered the most often. Other plant pathogens recorded included bacteria (4 percent) and viruses (less than 1 percent). No phytoplasmas or parasitic plants were detected in the samples for 2005. Of the other plant disorders, abiotic symptoms comprised 6 percent, while insects accounted for 1 percent. No pathogens were found on 37 percent of the samples.

#### **Permits for genetically modified organisms**

ODA does not have specific regulations for transgenic organisms, but we cooperate with USDA in their permit process. In 2005, 33 notifications and permits for transgenic plants were reviewed by ODA. Nine different crops and one bacterium were modified for a wide variety of traits (see table). The notifications and permits were reviewed to ensure that the transport and/or growth of the transgenic organisms would not violate any existing state quarantines and control area orders and would not pose a significant risk to Oregon agriculture. Along with USDA officials, ODA representatives also inspected the research sites of several transgenic permit and/or notification holders.

<b>Crop/other</b>	<b>No. of applications</b>	<b>Trait added</b>
Canola	3	HR
Corn	4	IR, AP, HR, FR, MG, OO, PQ, HT

Creeping bentgrass	3	HR,AP,MG
Kentucky bluegrass	1	AP,HR
Poplar	10	MG,HT,AP,OO,PQ
Soybean	4	AP,PQ,HR,FR,MG,IR,OO,NR,BR
Sugarbeet	6	HT,HR
Sweetgum	1	OO
Agrobacterium tumefaciens	1	AP

\*HR=herbicide resistant, IR=insect resistant, AP=agronomic properties, FR=fungus resistant, MG=marker gene, OO=other, PQ=product quality, HT=heat tolerant, NR=nematode resistant, and BR=bacteria resistant.

#### Quarantines and control area orders

Staff reviewed Plant Health Section quarantines and control area orders (CAO) to determine if the rules needed to be updated or repealed. This process began in 2003 and resulted in the repeal of several inactive or ineffectual quarantines and CAOs. In 2005, the Dutch elm disease, peach rosette phytoplasma, Phytophthora ramorum and peach yellows quarantines were updated to reflect new information about the pathogens and their known distribution. The bean disease CAO for Malheur County was updated to add new pathogens and to mirror a complementary rule in Idaho. The P. ramorum regulated area for nursery stock was updated to reflect changes in the federal regulations for this pathogen. The control area order for Allium white rot in central Oregon was repealed in favor of a statewide white rot of vegetative Allium seed certification program.



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